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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S) : Lalit K. Mestha, et al.

TITLE : MODEL BASED DETECTION AND
COMPENSATION OF GLITCHES IN
COLOR MEASUREMENT SYSTEMS

APPLICATION NO. : 10/000,379

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EXAMINER : George R. Koch

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REPLY BRIEF UNDER 37 C.F.R. §41.41

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Reply Brief is responsive to the Examiner's Answer mailed July 14, 2006 regarding the above-referenced patent application.

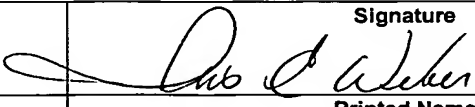
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Reply to the Response to Arguments

As a general point, the Applicants take the position that the Examiner has been misinterpreting the primary reference to Wolf. Additionally, the Response to Argument section of the Examiner's Answer misrepresents the position of the Applicants.

For example, on page 5 of the Examiner's Answer, under the subheading -- Response to Argument--, the Examiner's Answer asserts that "Applicant does acknowledge that Wolf does provide for a correction" and appears to mean to direct the attention of the reader to page 9, lines 20-23, of the Appeal Brief in support of this assertion. However, the referenced sentence reads, in its entirety, "The low density compensator provides for a correction for the high density compensator; together they provide color calibration and compensation for slow drift of the printer." This statement is taken from Wolf, column 6, lines 55-58. Furthermore, the point the Applicants were making is that the low density compensator (i.e., MAPP2 of Wolf) provides a correction for the high density compensator (i.e., MAPP1) and not for a color measurement system. Furthermore, together they (i.e., MAPP1 and MAPP2) provide color calibration and compensation for slow drift of the printer, and not for a color measurement system.

In the same paragraph on page 5, the Examiner's Answer asserts that "Applicant also acknowledges later in the Brief, at pages 10-12, that MAPP2, which processes the sensor signals, has transformation equations or tables are periodically updated." However, Applicants do not acknowledge that the MAPP2 processes sensor signals. Indeed, for example, on page 10, lines 9-12, the Appeal Brief indicates that, "while FIG. 1 depicts a signal from the sensor 70 delivered to the MAPP2, that signal is not processed by or replaced by the MAPP2. Instead, the signal from the sensor is used to periodically update transformation equations or tables within the MAPP2 (column 6, lines 3-15 and 27-33).

The Examiner's Answer goes on to assert that "Applicant essentially argues that this correction is not the same as a signal replacement." However, this is not the essence of the Applicants' argument.

The position of the Applicants, with regard to the Wolf reference, is that during normal operation, the MAPP2 receives color data from the document creator 10 ($R_cG_cB_c$) and transforms that color data into values associated with a device independent color space ($L_c^*A_c^*B_c^*$) (column 6, lines 16-26). The signal from the

densitometer/spectrophotometer is not processed or replaced by the MAPP2. Furthermore, the MAPP2 does not detect glitches or transient errors in a measurement system or the sensor 70 or make the comparisons or signal replacements recited, for example, in **claim 1** of the present application. Instead, the MAPP2 provides a compensation for drifts associated with the printer 50 (column 2, lines 1-11; column 5, lines 19-38).

The subject paragraph of the Examiner's Answer concludes with, "since correcting one of the inputs or tables in Wolf results in a replacement of **the signal**, the structures of Wolf meet the replacement function limitation" (emphasis added).

However, even if the function of the MAPP2 of Wolf could be construed as a replacement of a signal, the signal processed by Wolf is color data from the document creator 10 and not a signal from a color measurement system (column 6, lines 16-26). The next paragraph begins by characterizing the issue between the Examiner and the Applicants as a "discrepancy between the various scope of claim interpretation." However, the Applicants disagree.

The issue is not the breadth of the meaning of words in the claims but is, instead, whether or not the Office is considering all of the words in the claim and whether or not the reference anticipates each of the elements in the claim. It is respectfully submitted that, even given its broadest reasonable interpretation, the updating of tables disclosed in Wolf does not disclose or suggest comparing a measured color signal to an expected color signal to produce a color error value and selectively replacing the measured color signal based on the color error value as recited in **claim 1**.

It is respectfully submitted that whether or not the slow drifts of the printer of Wolf are reasonably classified as glitches or transients is immaterial. The issue is that Wolf discusses the periodic calibration of a printer (through a process which assumes that readings from the sensor are correct) and that the claims of the present application are directed toward detecting transient errors in a color measurement system, and when transient errors are detected, providing a reasonable replacement value so that systems that rely on such measurements remain stable and do not generate dramatic control efforts based on an erroneous measurement signal.

The next paragraph of the Examiner's Answer refers to page 11 of the Appeal Brief and asserts that "Applicant argues that Wolf does not disclose or suggest

'processing transient errors'." However, this is a misrepresentation or misinterpretation of the position of the Applicants. The referenced portion of page 11 of the Appeal Brief submits that "Wolf does not disclose or suggest a method of processing transient errors **produced in a color measurement system** monitoring a color-producing process." The Examiner's Answer goes on to assert that since "Applicant does acknowledge that Wolf correct the equations and tables" therefore Wolf meets the claim limitations.

However, it is respectfully submitted that disclosure of correcting equations or tables does not constitute disclosure of a method of processing transient errors produced in a color measurement system. Therefore, it is respectfully submitted that Wolf does not disclose or suggest or anticipate the subject matter of the preamble of **claim 1**.

The next paragraph of the Examiner's Answer refers to page 12 of the Appeal Brief and asserts that Wolf meets the comparison step (of **claim 1**) because "Wolf essentially compares the measured color signal (output from densitometer/spectrophotometer 70) with an input or expected signal ($R_cG_cB_c$) to produce a transformation value which is an error signal."

However, the Examiner's Answer provides no citation to Wolf to support the assertion. Additionally, the Examiner's Answer equates the input ($R_cG_cB_c$) of Wolf signal to an expected color signal. However, this would cast the MAPP2 in the role of a comparator and the output of the MAPP2 (dotted arrow pointing toward MAPP1) in the role of an error signal indicating a difference between the spectrophotometer signal 70 and the document creator signal $R_cG_cB_c$. However, the output of the MAPP2 is simply a transformation of the input signal and does not represent a difference or error between spectrophotometer signal and the document creator signal (column 6, lines 19-21).

Note, it is respectfully submitted that column 6, line 18, of Wolf includes a typographical error and should refer to $R_cG_cB_c$ instead of $L^*A^*B^*$ to be consistent with FIG. 1. However, column 3, lines 44-55, indicate that colorimetric terms from the document creator 10 can be in other forms including, for example, $L^*A^*B^*$. Clearly, the output of the MAPP2 (or MAP2 as it is referred to in the text of Wolf) is a translated color request from the document creator and is not an error signal indicating a difference between that request and a sensed color. Indeed, it is respectfully submitted that the requested color has not been produced at the point

the signal is leaving the MAPP2 and could not be measured by the spectrophotometer 70 at the point the color request is processed by the MAPP2. Therefore, the function of the MAPP2 does not “meet the claim scope,” contrary to the assertions of the Examiner’s Answer.

In the last paragraph on page 6, the Examiner’s Answer addresses the final paragraph on page 12 of the Appeal Brief and asserts that “Applicant argues that Wolf does not disclose signal replacement.” However, this is a misrepresentation or misinterpretation of the position of the Applicants. The last paragraph on page 12 of the Appeal Brief points out that in the system of Wolf, the information from the sensor 70 is assumed to be correct. The sensor signal is used to update values in the MAPP2. However, the signal itself (i.e., the color measurement signal) is not replaced with a substitute signal (e.g., such as a signal from a model or record of past performance). Indeed, in Wolf, the signal from the sensor is not even tested to determine if the signal from the sensor is reasonable (i.e., is associated with a reasonable color error value). It is respectfully submitted that updating calibration values based on a measurement is not the same as, and does not anticipate, replacing the measurement value.

For at least the foregoing reasons and/or the reasons presented in the Applicants’ Appeal Brief, **claim 1**, as well as claims 2-5, which depend therefrom, is not anticipated by Wolf and appeal from the decision of the Examiner is respectfully requested.

With regard to **claim 2**, the Examiner’s answer directs the attention of the Applicants to column 4, lines 19-25, of Wolf and asserts that the lookup tables discussed therein are for signal correction. However, it is respectfully submitted that the lookup tables discussed at column 4, lines 19-25, **are not for correcting, modifying or replacing a signal from a sensor or color measurement system.**

The Examiner’s Answer also directs the attention of the Applicants to column 4, lines 10-12, lines 40-45 and 55-63. However, the tables discussed at lines 10-12 are for a linearization process that occurs after under color removal (column 4, lines 4-10 and column 3, line 36 - column 4, line 10) and are unrelated to replacing a measured color signal with a predicted color signal based on an expected color signal, or replacing a measured color signal with a predicted color signal on any basis.

Column 4, lines 40-45, discuss a plurality of methods for providing a transform from device independent data to device dependent data (column 4, lines 36-40) and are unrelated to replacing a measured color signal with a predicted color signal based on an expected color signal, or on any other basis.

Column 4, lines 55-63, explain that modern color printers often receive color specifications in a device independent color format. The printer must then convert these color specifications into amounts of colorants to use in order to produce the desired color. Because printers are typically non-linear in their behavior, a color lookup table and interpolation is often used to find colorant amounts for a desired color value. The process of determining the proper table entries for the printer is known as color calibration.

It is respectfully submitted that nothing in column 4, lines 55-63, discloses or suggests replacing a measured color signal with a predicted color signal based on an expected color signal, or on any other basis.

For at least the foregoing reasons, Wolf does not anticipate **claim 2** and appeal from the decision of the Examiner is respectfully requested.

In regard to **claim 4**, the Examiner's Answer asserts (apparently for the first time) that "Stokes discloses that an empirical model can be used, i.e., an online statistical parameterized model, and an empirical/statistical model involves historical values." However, the Examiner's Answer provides no citation to support this assertion. Further in this regard, it is noted that earlier in the Examiner's Answer, at the bottom of page 4 and top of page 5, the Examiner's Answer provides references to column 5 and column 9 of Stokes in regard to **claim 4**. It is noted that the cited portion of column 9 (lines 3-8) indicate that a model is used to create values for a multi-dimensional lookup table. It is respectfully submitted that this would appear to contradict the position of the Examiner that the lookup tables of Wolf (i.e., MAPP1 and MAPP2) are themselves models.

For at least the foregoing additional reasons, it is respectfully submitted that **claim 4** is not anticipated and is not obvious in light of Wolf, Balasubramanian - 1996 and Stokes.

At the bottom of page 7 and the top of page 8, the Examiner's answer presents (for the first time) motivation for combining Wolf, Balasubramanian - 1996 and Stokes. However, as was pointed out in Applicants' Response C, Amendment D (which was not entered) and the Applicants' Appeal Brief, no motivation for

combining these references was suggested in the Office Actions. Furthermore, it is respectfully submitted that the suggested motivations presented now are specious.

For example, with regard to **claim 4**, the Examiner's Answer asserts that "motivation would have been generally available to one in the art." However, there is no support for this assertion. The Examiner's Answer goes on to say "one in the art would appreciate that such models would be built on a large number of measurements and would thus provide optimal accuracy, at a trade off which is increased complexity. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized such an empirical model in order to achieve optimal accuracy." However, Wolf achieves optimal accuracy with the MAPP1 and MAPP2. Wolf does not disclose or suggest the need for an empirical model. Furthermore, it is respectfully submitted that the MAPP1 and MAPP2 are tables and are not models (i.e., see column 9, lines 3-8, of Stokes). Moreover, even if the MAPP1 and MAPP2 of Wolf are considered to be models, and even if there were some motivation to replace one of the MAPP1 and/or the MAPP2 with models of Balasubramanian - 1996 or Stokes, such a combination would not provide a model used to predict an expected color signal which is compared to a measured color signal to produce a color error value whereby a measured color signal is selectively replaced based on the color error value. Wolf, Balasubramanian - 1996 and Stokes do not disclose or suggest testing the validity of a signal from a color sensor or replacing the signal from the color sensor with a substitute signal if the signal from the sensor is determined to be invalid. Moreover, Wolf, Balasubramanian -1996 and Stokes do not disclose or suggest replacing a measured color signal with a historical color signal based on a historical value related to a monitored input. It is respectfully submitted that the only source of information related to replacing a signal from a color sensor or color measurement system is the present application. Therefore, the rejection of claim 4 can only be based on impermissible hindsight.

With regard to **claim 5**, the Examiner's Answer asserts that Stokes discloses that this model allows for faster modeling for the printer function and discusses the speed advantages in column 2 and 3. For this reason, the Examiner's Answer asserts that it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized such models in order to achieve faster modeling of the printer function. However, Wolf does not disclose or suggest modeling printer

function or express a desire or need for faster modeling of printer function. Wolf discloses a method of printer calibration. Furthermore, even if the method of printer calibration of Wolf is considered to include printer modeling (which is disputed) and even if the MAPP1 or MAPP2 of Wolf could somehow be replaced with the "five sample steps" model of Stokes, making such a replacement would not arrive at the subject matter of the present application. Replacing MAPP1 or MAPP2 of Wolf with the model of Stokes would not provide a model to predict an expected color signal and would not disclose comparing the expected color signal to a measured color signal to produce a color error value and selectively replacing the measured color signal based on the color error value. Moreover, such a combination would not disclose or suggest such a method wherein the expected color signal is predicted using a refined parameterized Neugebauer model, a multi-dimensional numerical model or an on-line statistical parameterized model representative of the color-producing process. It is respectfully submitted that the present application is the only source from which such a suggestion could be gleaned. Accordingly, rejection of claim 5 is based on impermissible hindsight.

It is respectfully submitted that the restriction requirement mailed on February 24, 2004, which was traversed in papers mailed March 23, 2004 and again in papers mailed August 30, 2004, was based on similar errors of understanding and fact to those apparent in the Final Office Action and the Examiner's Answer. Accordingly, withdrawal of the restriction requirement is respectfully requested.

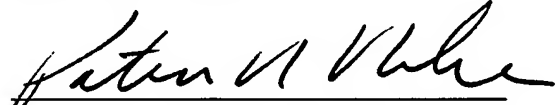
CONCLUSION

In view of the above, it is respectfully submitted that claims 1-5 are not anticipated and are not obvious in light of the cited references. Accordingly, it is respectfully requested that the Examiner's rejections be reversed.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & MCKEE, LLP

Date: Aug 8, 2006



Patrick R. Roche, Reg. No. 29,580
Thomas Tillander, Reg. No. 47,334
1100 Superior Avenue, Seventh Floor
Cleveland, Ohio 44114-2518
216.861.5582